Outcomes of a Community-Based Dissemination of the Health Enhancement Program

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OBJECTIVES: We previously found in an efficacy trial that a health promotion program prevented functional decline and reduced hospitalizations in community-dwelling older people with chronic conditions. We sought to evaluate the effectiveness of the program in its dissemination phase.

DESIGN: Outcome evaluation using a within-group, pretest-posttest design.

SETTING: Fourteen senior centers located throughout western Washington.

PARTICIPANTS: Three hundred four community-dwelling men and women aged 65 and older.

INTERVENTION: A disability-prevention, chronic disease–self-management program.

MEASUREMENTS: Participant characteristics, risk factors for disability, change in health and functional status, and healthcare use over 1 year of enrollment; participant satisfaction.

RESULTS: Participants were 71% female, had a mean age of 76, and reported three chronic health conditions on average. The percentage of participants found to be depressed decreased (28% at time of enrollment vs 17% at 1-year follow-up, $P = .005$). The percentage of physically inactive participants decreased (56% vs 38%, $P = .001$). Physical activity level and exercise readiness improved (Physician-based Assessment and Counseling for Exercise mean score 4.3 vs 5.1, $P = .001$). At follow-up, 83% rated their health the same as or better than a year ago, compared with 73% at time of enrollment. The proportion with impaired functional status, as measured by bed days and restricted activity days, stayed the same. The proportion hospitalized remained stable (23% at enrollment and follow-up, $P = 1.0$).

CONCLUSIONS: Under real world conditions, the Health Enhancement Program reaches older people at risk of functional decline. Those enrolled for 1 year experience a reduction in disability risk factors, improvement in health status, no decrements in functional status, and no increase in self-reported healthcare use. **J Am Geriatr Soc 50:1519–1524, 2002.**

Key words: aged; risk factors; health services for the aged/organization and administration/utilization; outcome and process assessment (health care); self-care

The Health Enhancement Program (HEP) is a community-based wellness intervention designed to promote the health and functioning of community-dwelling older adults at risk of functional decline.[1] The intervention was designed to identify potentially modifiable risk factors for disability and promote behavior change to reverse those risk factors, with the hypothesis that this would reduce the risk of subsequent functional decline. It was intended to complement the activities of primary care and was delivered outside the practice setting while maintaining contact with a patient's primary care physician. A randomized trial conducted in the mid-1990s examining the efficacy of this intervention found that subjects in the intervention arm had less functional decline and fewer hospitalizations than controls.[1]

Because of the benefits demonstrated in the randomized trial, HEP has been disseminated to senior centers in western Washington, with funding provided by the local area agency on aging. In the process of dissemination, several notable modifications have occurred, including a shift away from management by a nurse practitioner with formal geriatric training to registered nurse management, a decrease in the amount of interaction with primary care, and increased depression support (e.g., availability of increased social worker involvement and, depending on the senior center, a depression support group) at some centers.

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We undertook the present evaluation to determine whether the effects of 1 year of program participation on risk factors for functional decline, health and functional status, and healthcare use that were observed in the randomized trial persisted when the program was implemented under real-world conditions rather than as part of a research investigation. If a similar degree of effect as that observed in the randomized trial was occurring, wider dissemination of this program might be warranted.

METHODS

Setting

The intervention was conducted at 14 senior centers in western Washington. Senior centers were chosen as the venue because data indicated that 25% of American seniors use senior centers, suggesting that a senior center locale would make a health promotion program accessible to a large number of individuals who might be eligible and likely to benefit.[2] The randomized trial of HEP had shown that noncenter users would attend if invited.[1] Because increasing chronic disease self-management, encouraging regular exercise, and enhancing social connections were critical elements of the intervention, a community setting was preferred.

Participants

In keeping with the targeting criteria used in the efficacy trial,[1] participants targeted for the intervention in the dissemination of HEP were ambulatory, community-dwelling adults aged 70 and older with at least one chronic illness, excluding dementia and terminal disease, and therefore at risk of functional decline. Six hundred forty adults enrolled in HEP from January 1997 through December 1999. Seventy-five of these were younger than 65 and were excluded for purposes of these analyses. Ten others were excluded because age and date of birth were not provided. Participants were recruited via letters, signed by and mailed from their primary care provider's (PCP's) office, recommending HEP and giving the name and phone number of the nearest HEP nurse. Potential enrollees were encouraged to call the HEP nurse themselves. For potential enrollees who did not call, the nurse called, explained the program, and invited them to come to the site. PCP practices were affiliated with healthcare systems that were financial contributors to HEP in some way, usually in the form of salary support to the HEP nurse. Letters were not mailed to patients who PCPs indicated were inappropriate for the program (nonambulatory or having dementia or terminal illness). Subjects also self-referred or were referred by community case managers, social workers, and others who recognized that the individuals were at risk of functional decline and would benefit from a program geared toward disability prevention through self-management of chronic conditions, increased physical activity, and social activation.

Intervention

The intervention was based on the conceptual model of disability formulated by Buchner et al., which posits that predictors of disability such as chronic disease, physical inactivity, and social isolation can be modified to reduce susceptibility to functional decline.[3] The HEP nurse conducted an initial assessment of health and functional status and risk factors for disability and then, working with the participant, developed a "health action plan," a personalized plan, modified to the participant's personal goals and preferences, that addressed at least one disability risk factor identified by the assessment. All participants were encouraged but not required to enroll in three core components of the intervention: an evidence-based exercise class (Lifetime Fitness Program);[2] a chronic disease self-management course developed by Lorig et al.;[4] and pairing with a trained volunteer senior, or "health mentor," who attended senior center activities and offered peer support.[5] Participants also met, as they desired, with the social worker hired specifically for HEP for monitoring of psychosocial issues identified in the initial assessment. If depression was detected, participants were encouraged to meet with the social worker.

Data Collection

Data collection targeted the outcomes of health and functional status and healthcare use. Information was collected at enrollment and at a 12-month follow-up visit using a written questionnaire. The HEP nurse mailed the questionnaire to participants in advance of the initial assessment to allow them to complete it at their own pace. The nurse reviewed participants' responses for completeness and accuracy at the initial visit and assigned a code number to each participant. Sociodemographic information was also collected at the initial assessment. Each senior center submitted completed questionnaires to a central repository, the offices of Senior Services of Seattle/King County, which then transferred data via scanner into a database with participant code numbers as the only identifier. This database was made available to researchers at the University of Washington for analysis. The University of Washington Institutional Review Board approved the data collection procedures.

Several scales were used to measure modifiable risk factors for disability. The short form (15-item) Yesavage Geriatric Depression Scale (GDS) was used to evaluate depressive symptomatology; a score greater than 5 is consistent with a diagnosis of depression.[6,7] The Physician-based Assessment and Counseling for Exercise (PACE) scale was used to evaluate physical activity level and exercise readiness;[8] a score of 4 or less (of 11) corresponds to exercising no more than infrequently and served as our definition of physical inactivity. To evaluate social embeddedness, we used three questions: (1) "In the period of a month, about how often do you go to meetings of clubs or informal groups that you belong to?" (2) "In the period of a week, how many social telephone calls do you make and receive?" (3) "In the period of a week, how many social visits do you make and receive?" and created a composite score for these three questions. The range of possible scores was from 4 to 11; scores at the low end of the range correspond to a low frequency of social contacts. We used a score of 5 or less to indicate social isolation. Nutritional risk was assessed using the Nutrition Screening Initiative DETERMINE (*d*isease, *e*ating poorly, *t*ooth loss or mouth pain, *e*conomic hardship, *r*educed social contact, *m*ultiple mediations, *i*nvoluntary weight loss or gain, *n*eed for assistance in self care, and *e*lderly) screening tool.[9] A score of 4

or greater on the DETERMINE instrument indicates a greater likelihood of poor health at baseline and functional disability a year later.[9]

We assessed functional status using the National Health Interview Survey (NHIS) bed disability days questions: "In the past 12 months, did you stay in bed because of illness or injury? If yes, how many days did you stay in bed?" Previous analyses have shown that this measure can detect (is responsive to) important changes in functional status in relatively healthy older populations over time.[10] We also assessed restricted activity days with two NHIS questions analogous to the bed disability days questions.[11] We used the Medical Outcomes Study (MOS) question on self-rating of health compared with a year ago as a measure of health status.[12–14]

Information about hospital use in the 12 months before and after enrollment was obtained by self-report, using the questions: "In the past 12 months, were you ever in the hospital overnight for physical health problems? If yes, how many days were you in the hospital overnight?"

Information about participant satisfaction with the program and perceptions of the program's effect on participant health was elicited with a five-item questionnaire that was completed after 12 months of participation. The questionnaire was mailed to participants along with a stamped, addressed, return envelope. Participants were asked to not record their name on the questionnaire so that responses would be confidential.

Data Analysis

Data were analyzed using a one-group, pretest-posttest design. We used McNemar's test for matched pairs to assess differences between enrollment and follow-up for categorical variables and paired *t* tests for continuous variables.

RESULTS

Participant Retention and Characteristics

Initial and 1-year follow-up data on 304 (55%) of the 555 enrollees aged 65 and older were available for the analyses. Fourteen participants died before their 12-month follow-up. One-year follow-up data were not obtained (n = 237) for 145 (i.e., 26% of the 555 enrollees and 61% of the 237 without 1-year follow-up data) who discontinued, 40 who were discharged to a higher level of care, 44 who moved away, and eight whose follow-up data were collected at 18 rather than 12 months of follow-up. The most frequent reasons given by participants for discontinuing were "no longer interested" and "no longer involved in the senior center."

Table 1 shows selected demographic and health characteristics of participants at time of enrollment in HEP, comparing those who completed 1 year of the program with those who did not. Participants had an average age of 76, were mostly female, predominantly white, and had a mean of three chronic health conditions and a mean score of 64.8 (out of a possible 100, where higher scores indicate higher function) on the MOS physical function scale (data not shown). There were no significant differences between the groups other than the proportion who were current smokers. Additional analyses (not shown in Table 1) showed no significant differences in the mean number of comorbidities (3.5 for those who did not complete 1 year vs 3.4 for those who did, $P = .5$), mean depression score (3.9 vs 3.8, $P = .5$), mean PACE score (4.1 vs 4.3, $P = .4$), or mean number of alcoholic drinks per day (0.9 vs 0.8, $P = .1$). There were no significant differences in proportions hospitalized in the year before enrollment (26% of participants who did not complete one year of participation vs 23% of participants who did, $P = .4$).

To understand which factors might predict adherence to the program, we compared the 304 people who completed 1 year with the 145 who discontinued on their demographic and health characteristics. Those who discontinued were younger (mean age 74.4 years vs 75.9 years, $P = .029$) and more likely to be smokers (9.0% vs 2.6%, $P = .003$).

Disability Risk Factors

Table 2 shows the percentage of participants reporting risk factors for disability targeted by HEP, along with the severity of these same disability risk factors, at enrollment and after 1 year of participation in HEP. The number of

Table 1. Demographic and Health Characteristics of Participants at Time of Enrollment, Comparing Those Completing 1 Year with Those Not Completing 1 Year

Characteristic	Completing 1 Year (n = 304)	Not Completing 1 Year (n = 251)	*P*-value
Age, years, mean ± standard deviation	75.9 ± 6.6	76.0 ± 6.7	.830
Female, %	70.9	67.2	.356
Non-white, %	11.5	8.0	.383
Income, median monthly, $	1,285.0	1,352.0	.273
Chronic medical conditions, %			
Heart problems	33.3	35.9	.534
Diabetes mellitus	20.5	22.3	.597
Hypertension	52.1	57.0	.256
Arthritis	57.4	58.2	.860
Emphysema	14.5	16.7	.474
Nervous or emotional problems	16.4	19.1	.421
Current smoker	2.6	7.6	.009

Table 2. Percentage of Participants with and Severity (Mean Score) of Disability Risk Factors at Enrollment and After 1 Year of Program Participation

Risk Factor	At Enrollment	At 1-Year Follow-up	*P*-value
Depression (n = 184)			
Percentage	28	17	.005
Mean GDS score*	3.8	2.9	.001
Physical inactivity (n = 178)			
Percentage	56	38	.001
Mean PACE score†	4.3	5.1	.001
Low frequency of social contact (n = 177)			
Percentage	18	15	.458
Mean social activity score‡	7.4	7.7	.029
Nutritional risk (n = 176)			
Percentage	45	37	.086
Mean DETERMINE score§	4.0	3.6	.081

Note: For persons with complete data at enrollment and follow-up. N's vary because of variation in the number of persons who answered each question completely at enrollment and follow-up and because of changes in questionnaire construction over the period of program dissemination.
*Scores >5 (range 0–15) suggest depression.
†Scores ≤4 (range 1–11) indicate physical inactivity.
‡Scores ≤5 (range 4-11) on the social activity scale indicate social isolation.
§Scores ≥4 (range 0-21) on the Nutrition Screening Initiative DETERMINE instrument indicate a greater likelihood of poor health at baseline and functional disability a year later (see text for explanation for acronym).
GDS = Yesavage 15-item Geriatric Depression Scale; PACE = Physician-based Assessment and Counseling for Exercise.

participants with depressed mood decreased significantly from enrollment to follow-up, and we observed a significant decrease in the mean GDS score for the group. The number of participants who were physically inactive decreased significantly from enrollment to follow-up, and the average PACE score for the group increased significantly. Roughly one-fifth of participants had infrequent social contact at time of enrollment; this proportion did not materially change. There was no significant change in the number of participants with nutrition risk at the follow-up assessment.

To address the possibility that the ≈40% of participants for whom the measures shown in Table 2 were *not* obtained at both enrollment and follow-up might have done worse as a group, and thereby reverse the results reported in Table 2, we compared them with the ≈60% for whom data were obtained at both enrollment and follow-up (shown in Table 2) on demographic and health characteristics, functional status, health status, and hospitalizations at time of enrollment. There were no significant differences between the groups, except for the proportion who reported having arthritis (66% of those without complete data vs 51% with complete data, $P = .008$).

Health Status, Functional Status, and Hospitalizations

Table 3 shows the health and functional status and inpatient use of participants at enrollment and after 1 year of participation in HEP. The proportion of participants who reported that their health was the same or better a year before increased, whereas the proportion reporting that their health was worse decreased significantly. The number of participants with one or more bed days and the mean number of bed days did not materially change. The number of participants with one or more restricted activity days did not change, and the decrease in the mean number of restricted activity days was not significant. The number of participants hospitalized and the mean number of hospital days did not change from enrollment to follow-up.

Participant Satisfaction

Satisfaction questionnaires were returned by 60 (20%) of the participants who completed 1 year of the program. Of those, 97% felt they had been able to spend the time they needed with the nurse and social worker, 85% reported that they had been helped to make lasting health changes, and 97% indicated that they would recommend the program.

DISCUSSION

Community-dwelling seniors who participated in a chronic disease–management, disability-prevention intervention for 1 year sustained a reduction in disability risk factors. Specifically, there appeared to be a reduction in the numbers of those who were depressed and those who were physically inactive. Those participating in the intervention experienced a highly significant reduction in their level of depressive symptomatology and improvement in their level of physical activity and exercise readiness. There was a significant improvement in self-perceived health over the year of program participation. Functional status and inpatient use remained stable.

The findings from the present effectiveness study can be considered alongside the results from the randomized trial of HEP.[1] A larger proportion of subjects in the dissemination phase were women (64% of subjects in the intervention arm of the efficacy trial were women), and a larger proportion reported having diabetes mellitus (16% in the efficacy trial). With regard to disability risk factors, improvement in physical activity and exercise readiness, assessed by the PACE score, was also observed in the effi-

Table 3. Health and Functional Outcomes and Utilization at Enrollment and After 1 Year of Program Participation

Outcome Variable	At Enrollment	At 1-Year Follow-Up	*P*-value
Health compared with a year ago, % (n = 280)			.002*
Much better	8.6	16.1	
Somewhat better	17.1	24.3	
About the same	47.5	42.9	
Somewhat worse	23.2	13.6	
Much worse	3.6	3.2	
≥1 bed day, n (%) (n = 281)	69 (25)	69 (25)	1.000
Bed days, mean (n = 269)	3.2	2.8	.811
≥1 restricted activity day, n (%) (n = 277)	119 (43)	114 (41)	.709
Restricted activity days, mean (n = 239)	29.6	18.3	.062
Hospitalized, n (%) (n = 275)	63 (23)	64 (23)	1.000
Hospital days, mean (n = 275)	1.5	1.4	.833

Note: For persons with complete data at enrollment and follow-up. N's vary because of variation in the number of persons who answered each question completely at enrollment and follow-up and because of changes in questionnaire construction over the period of program dissemination.
*Responses dichotomized by grouping about the same or better responses together and worse responses together.

cacy trial. By contrast, depression and nutrition scores were not affected in the efficacy trial. Participants in the dissemination experienced improvements in health and no decline in function, whereas the intervention group in the efficacy trial showed less decline in function than the control group.

We did not observe the substantial reduction (from 21% in the baseline year to 13% at follow-up) in hospital use found in the efficacy study, but the efficacy trial used administrative data from insurers as the source of information on hospitalizations, whereas we did not have access to claims data as part of the dissemination. Limited accuracy of self-reported estimations of healthcare use has been observed by others;[15,16] therefore, we suspect that our ability to detect changes in hospital use was limited by our method of ascertainment. Even if one were to assume accuracy of self-report in the dissemination study, an alternative interpretation of our result would be that no increase in the proportion hospitalized over a 1-year period actually represents a desirable (but not necessarily expected) outcome for those in this age group with a comparable burden of chronic illness. One might predict that this rate would increase with each year of increasing age. Although we were unable to locate longitudinal data on hospitalization rates by year for a birth cohort of individuals with chronic disease in their eighth decade of life, an increase in the proportion hospitalized in the control group (a proxy for the birth cohort of older individuals not receiving any intervention over a year's time) of the efficacy trial (9%, based on 13% in the baseline year and 22% in the follow-up year) was observed.[1]

Limitations of our evaluation deserve mention. First, as indicated by the "n's" in Tables 2 and 3, there was a substantial amount of missing data on participants who remained enrolled for 1 year. This was due to variation in the number of persons who answered each question on the written questionnaire completely at both enrollment and follow-up and also to the fact that the questionnaire was revised over the period described herein, such that some questions were not asked of every participant at both enrollment and follow-up. This amount of missing data raises concerns about the validity of the results in Table 2, but, comparing those who were missing data in Table 2 with the persons who were not missing information on these Table 2 items, we found that they were essentially no different with respect to their demographic and health characteristics, functional status, health status, or hospitalizations at time of enrollment. With regard to the satisfaction data, the response rate to the satisfaction questionnaire was low; thus, the satisfaction results reported herein are potentially biased and must be viewed with caution. Second, several participants who enrolled and on whom initial information was collected did not continue in the program for a full year. This is likely due at least in part to aggressive efforts to enroll a large number of new participants into the program over the dissemination phase, which may have resulted in inclusion of individuals who agreed to participate because they were invited but were too disabled or reluctant to participate fully in the intervention. The observation of a number of participants who were discharged to a higher level of care lends support to this hypothesis. Although we did not find significant differences (other than proportions of smokers) between the dropouts and year-long participants on measures obtained at time of enrollment, the large proportion (≈43% of those enrolled) lost to follow-up raises concern about bias. Had a lower dropout rate been observed, the effects of the intervention on the outcomes assessed may have been generally more positive, because at least a proportion of the dropouts appeared to be more disabled and would have been more likely to benefit from the intervention had they participated fully in it. Replication of this evaluation with every attempt to minimize losses to follow-up and ascertain outcomes for those who are lost is warranted.

These limitations notwithstanding, certain strengths merit mention. First, the program continued to reach its target population (older adults with chronic conditions and at risk of functional decline). Second, data were successfully collected on a large number of participants from a wide variety of senior centers, despite several threats to

the program's existence, including unstable sources of program funding and high staff (nurse and social worker) turnover.

In conclusion, our evaluation demonstrates that the HEP, now operating under real-world conditions, is reaching seniors at risk of functional decline. Participants who remain enrolled for 1 year appear to have a decreased burden of disability risk factors, improvement in health status, and no worsening of function or increase in inpatient use.

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